

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-14 are presently active, Claims 3, 5, 6, and 9 have been presently amended, and Claims 11-14 have been presently added.

In the outstanding Office Action, Claims 1-4 and 7-10 were rejected under 35 U.S.C. § 102(e) as being anticipated by Tsubone (Japan Publication No. 10-313041); and Claims 5 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsubone in view of Uryu (Japan Application No. 09064144).

Claims 3, 5, 6, and 9 were amended to more particularly define the present invention. The amendments to Claims 3, 5, 6, and 9 are supported by the original disclosure of this application, see, for example, page 13, lines 21 to 24, page 15, lines 3 to 6, page 18, line 24 to page 19, line 1, and page 33, lines 6 to 14, along with the corresponding figures. New Claims 11 to 14 are supported by the original disclosure of this application, see, for example, page 15, lines 3 to 9, page 17, lines 7 to 12, page 27, lines 8 to 11, and page 30, lines 24-26, along with the corresponding figures. No new matter has been added.

Applicants respectfully traverse the 35 U.S.C. § 102(e) rejection based on Tsubone for the following reasons.

Regarding Claim 1, MPEP § 2131 states that to anticipate a claim the reference must teach every element of the claim, and sets forth the following case law:

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). … “The identical invention must be shown in as complete detail as is contained in the … claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Claim 1 is directed to a treatment subject receiving vessel body. Claim 1 recites, in part, a treatment subject vessel receiving body that includes “an openable and closable exhaust port **disposed in the vessel main body** to exhaust the vessel main body.” Claim 1 also recites that “the vessel main body becomes sealed **airtight when the gate valve and the exhaust port are closed.**” Because the openable and closable exhaust port is disposed in the vessel main body, the interior of the vessel main body can be pumped even when the gate valve is closed, as described at page 17, lines 13-20 of the specification.

The Office Action takes the position that Tsubone discloses an openable and closable exhaust port (2) disposed in the vessel main body, wherein the vessel main body becomes sealed airtight when the gate valve and the exhaust port are closed.¹ However, Applicants respectfully submit that reference numeral 2 in Figure 2 of Tsubone depicts a vacuum moving device and not an exhaust port, as described in paragraphs [0012] and [0013] of the English translation of Tsubone.

Reference numeral 13 in Figure 2 of Tsubone depicts a valve through which exhaust gas is vacuumed, as described in paragraph [0013] of the English translation of Tsubone. However, valve 13 is **not disposed in the vessel main body** 4, but is located in the load-lock chamber 6b outside the gate valve 5a.² Therefore, it is respectfully submitted the interior of the vessel main body 4 of Tsubone cannot be pumped by the exhaust valve 13 **when the gate valve 5a is closed.**

Consequently, Tsubone does not disclose each and every element as set forth in the Claim 1. Hence, Claim 1 is not anticipated by Tsubone and is believed to patentably define over Tsubone.

Additionally, the dependent claims are allowable for at least the same reasons discussed above with respect to Claim 1 from which they depend. It is respectfully submitted

¹ See the Office Action, at numbered paragraph 3, on page 2.

² See the English translation of Tsubone, at paragraphs [0012] and [0013], along with Figure 2.

that the dependent claims also recite features not disclosed or suggested by the cited references, as discussed below.

Claim 2 recites, in part, that “the vessel main body includes an exhaust opening.” As discussed above, the exhaust valve 13 described in Tsubone is not disposed in the vessel main body 4. Therefore, it is respectfully submitted that Claim 2 is not anticipated by Tsubone and is believed to patentably define over Tsubone.

Claim 3 recites, in part, “a first transport auxiliary chamber...having a gas exhaust line for vacuum pumping an inner atmosphere of the first transport auxiliary chamber” and “a second transport auxiliary chamber...having a gas exhaust line for vacuum pumping an inner atmosphere of the second transport auxiliary chamber.” Thus, the first and the second auxiliary chambers can be exhausted *independently and directly* by the gas exhaust lines, and do not have to be exhausted via a processing chamber, for example. In the apparatus described in Tsubone, the first and second transport auxiliary chambers (7 adjacent 3a and 7 adjacent 3b, respectively) do not have gas exhaust lines for vacuum pumping the inner atmospheres of the first and the second transport auxiliary chambers.¹ Therefore, in the apparatus described in Tsubone, the atmospheres of the first and the second transport auxiliary chamber only can be exhausted *indirectly* via a processing chamber (one of 3a to 3c), or the load-lock chamber 6b. Therefore, it is respectfully submitted that Claim 3, and Claims 4, 8, and 9 which depend therefrom, are not anticipated by Tsubone and are believed to patentably define over Tsubone.

Claim 7 recites, in part, that “the common transfer chamber includes a positioning mechanism for performing positioning of the treatment subject.” It is respectfully submitted that Tsubone does not disclose or suggest that a transfer chamber includes a positioning mechanism for performing positioning of a treatment subject. Therefore, it is respectfully

submitted that Claim 7 is not anticipated by Tsubone and is believed to patentably define over Tsubone.

Claim 10 recites, in part, that “the first transport auxiliary chamber is provided with a gas supply line and the second transport auxiliary chamber is also provided with a gas supply line.” Therefore, a certain gas, such as an inactive gas, can be introduced *directly* in the first and the second auxiliary chambers by the gas supply lines, and does not have to be introduced via a processing chamber, for example. However, the first and second transport auxiliary chambers (7 adjacent 3a and 7 adjacent 3b, respectively) described in Tsubone do not have gas supply lines for introducing a gas therein.³ Therefore, in the apparatus described in Tsubone, the gas can only be introduced *indirectly* into the first and the second transport auxiliary chambers via a processing chamber or the load-lock chamber 6b. Therefore, it is respectfully submitted that Claim 10 is not anticipated by Tsubone and is believed to patentably define over Tsubone.

With regard to the rejection of Claims 5 and 6 as unpatentable over Tsubone in view of Uryu, it is noted that Claims 5 and 6 are dependent from Claim 1, and thus are believed to be patentable for at least the reasons discussed above. Additionally, it is respectfully submitted that Claims 5 and 6 also recite features not disclosed or suggested by the cited references, as discussed below.

Claim 5 recites, in part, that “a pair of buffer mounting tables are installed in the first transport auxiliary chamber for temporarily mounting thereon the treatment subject.” Thus, an unprocessed wafer can be mounted on one of the buffer mounting tables near a common transfer chamber and a processed wafer can be mounted on the other remaining buffer mounting table on the opposite side so that an efficient transfer of the wafers can be carried

³ See the English translation of Tsubone, at paragraphs [0012] and [0013], along with Figure 2.

out. It is respectfully submitted that neither Tsubone nor Uryu disclose or suggest that a pair of buffer mounting tables are installed in a first auxiliary chamber.

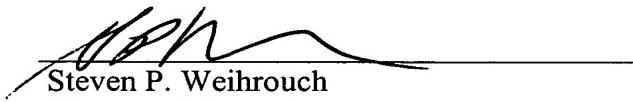
Thus, it is respectfully submitted that neither Tsubone nor Uryu disclose or suggest the above emphasized pair of buffer mounting tables, as recited in Claim 5. Assuming *arguendo* that Tsubone nor Uryu could be combined in a reasonable manner, the combination nevertheless fails to teach or suggest every element of Claim 5. Accordingly, it is respectfully submitted that Claims 5, and Claim 6 which depends therefrom, are patentable over Tsubone in view of Uryu.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for claims 1-14 is earnestly solicited.

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the below listed telephone number.

Respectfully submitted,

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ⁱ See the English translation of Tsubone, at paragraphs [0012] and [0013], along with Figure 2.

(19) Japanese Patent Office (JP)
(11) Publication No. : 1998-313041
(43) Date of publication of application : November 24, 1998
(51) Int. CL. : H01L 21/68; B01J 3/20

5 (21) Application NO. : 1998-104351

(22) Date of filing : April 15, 1998 (1998.04.15)
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[Title of the Invention]

A PLURALITY OF PROCESSORS

[Abstract]

[Object]

5 An object of the present invention is to provide a plurality of vacuum processing apparatuses capable of performing a plurality of continuous processes while avoiding a cross contamination in processing chambers and assuring high maintainability.

10 [Solution]

The vacuum processing apparatuses perform a plurality of processes on specimens in a plurality of vacuum chambers while maintaining a vacuum state throughout the processes or between the processes. In this case, the specimens are 15 transferred by another vacuum chamber capable of moving and connecting the aforementioned vacuum chambers.

[Claim]

[claim 1]

What is claimed is a plurality of vacuum processing 20 apparatuses for performing a plurality of processes on specimens in a plurality of vacuum chambers while maintaining a vacuum state throughout the processes or between the processes, wherein the specimens are transferred by another vacuum chamber capable of moving and connecting 25 the aforementioned vacuum chambers.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a plurality of vacuum processing apparatus for performing a plurality of continuous processes on specimens at a vacuum state; and, more particularly, to a semiconductor manufacturing apparatus.

[0002]

10 [Background of the Invention]

A plurality of conventional processing apparatuses have processing chambers connected with each other via a vacuum transfer chamber or the like (see, e.g., semi-conductor-world (Semi Conductor World), 1989. 8, pages 15 38 to 40).

[0003]

[Object of the Invention]

In the prior arts, the processing chambers are connected in a radial shape, so that a scale-up of an aperture of a specimen leads to a demand for a larger installation space or a restricted number of the processing chambers.

[0004]

Further, due to the radial shaped connection of the processing chambers in the prior arts, the positions of the specimens become different before and after the processes

and, also, the operability becomes poor. Moreover, it is difficult to standardize the size of the processing chambers.

[0005]

Furthermore, the processing chambers in the prior arts
5 are connected with a vacuum transfer chamber or the like. Therefore, a space for maintenance becomes insufficient and, also, a cross contamination occurs.

[0006]

An object of the present invention is to provide a
10 plurality of vacuum processing apparatuses for performing a plurality of continuous processes while avoiding a cross contamination in processing chambers and assuring high maintainability.

[0007]

15 [Solution]

In order to accomplish the above-described object, the processing chambers are separately maintained at a vacuum state and, also, the specimens are maintained at a vacuum state in a movable vacuum chamber.

20 [0008]

Accordingly, the specimens can be loaded/unloaded at a vacuum state, when necessary, by the vacuum chamber capable of moving between the vacuum chambers, each being maintained at a vacuum state. Therefore, the maintainability of the
25 processing chambers is improved. Further, since the vacuum levels in the vacuum chambers can be separately controlled,

it is possible to avoid the cross contamination in the processing chambers.

[0009]

[Embodiment of the Invention]

5 Hereinafter, an embodiment of the present invention will be described with reference to Figs. 1 and 2.

[0010]

A system shown in Fig. 1 includes a load unload device 1 for transferring specimens from the atmosphere to vacuum
10 and from vacuum to the atmosphere; a vacuum moving device 2 for receiving/delivering the specimens from/to the load unload device 1 at a vacuum state; and one or more processing modules 3a to 3c capable of loading/unloading the specimens into/from the vacuum moving device 2 at a vacuum
15 state.

[0011]

Fig. 2 shows configurations of the vacuum moving device 2 and one of the processing modules.

[0012]

20 In the vacuum moving device 2, a vacuum chamber is formed by the moving vacuum chamber 4 for maintaining the specimens at a vacuum state and a gate valve 5a to be opened when loading/unloading the specimens. Installed at the moving vacuum chamber 4 is a specimen mounting device 10 that operates when the specimens are loaded/unloaded.
25 Further, a moving device 11 is installed to allow the vacuum

moving device 2 to move between the load unload device 1 and the processing modules 3a to 3c. Furthermore, a connecting device 9 is provided to connect a lock chamber 6a installed at the moving vacuum chamber 4 with a lock chamber 6b of the 5 vacuum chamber of the load unload device or the processing modules 3.

[0013]

In the processing modules 3, a vacuum chamber is formed by a processing chamber 8 for processing the 10 specimens, a vacuum holding buffer chamber 7 for accommodating therein a carrier arm 16, and the lock chamber 6b connected with the lock chamber 6a of the vacuum moving device 2. The chambers communicate with each other via the gate valves 5b and 5c. The lock chamber 6b is connected via 15 the valve 15 with an N₂ gas source 14 for restoring the lock chambers 6a and 6b to the atmosphere. Further, the vacuum pump 12 for vacuumization is connected with the lock chamber 6b via the valve 13. Moreover, the load unload device 1 is provided with the same structure as that of the processing 20 modules 3.

[0014]

As described above, in accordance with this embodiment, the vacuum chambers of the processing modules are separately disposed from the load unload device, so that the specimens 25 can be processed at a vacuum state throughout the processes.

[0015]

[Effects of the Invention]

In accordance with the present invention, since the processing modules are separately provided, the specimens can be continuously processed at a vacuum state throughout the processes or during a part of the processes while avoiding a cross contamination in the vacuum chambers. In addition, the maintainability can be enhanced by the separation of the processing chambers.

[0016]

Further, since a vacuum level and a vacuum quality can be separately controlled in the respective processes, the control between the processing modules can be easily carried out.

[Best Description of the Drawings]

15 [Fig. 1]

Fig. 1 is a top view showing a configuration of a plurality of vacuum processing apparatuses in accordance with an embodiment of the present invention.

[Fig. 2]

20 Fig. 2 illustrates a vertical cross sectional view of a processing module of Fig. 1.

[Description of the Reference Numeral]

- 1 ... load unload device
- 2 ... vacuum moving device
- 25 3 ... processing module
- 4 ... moving vacuum chamber

5a to 5c ... gate valves
6 ... lock chamber
7 ... vacuum holding buffer chamber
8 ... processing chamber
5 9 ... connecting device
 10 ... specimen mounting device
 11 ... moving device
 12 ... vacuum pump
 13 ... valve
10 14 ... N₂ gas source
 15 ... valve
 16 ... carrier arm

[Fig. 1]

[Fig. 2]

[Submission Date] 1998, 5. 13.

[Procedure Amendment 1]

[Document] Specification

[Article] Title of the Invention

5 [Type] Amendment

[Contents]

[Title of the Invention]

A plurality of processing apparatuses

[Procedure Amendment 2]

10 [Document] Specification

[Article] Claim

[Type] Amendment

[Contents]

[Claim]

15 [claim 1]

What is claimed is:

a plurality of processing apparatuses comprising:

20 a plurality of processing modules, each having a separate configuration, for performing preset processes on specimens loaded thereinto;

first opening/closing parts installed at the processing modules to load/unload the specimens, the processing modules being closed by closing the first opening/closing parts;

25 a transferable closed vessel accommodating therein the specimens and having on one side thereof a second

opening/closing part for loading/unloading the specimens;

a moving device for moving the closed vessel so that the second opening/closing part of the closed vessel corresponds to a first opening/closing part of one of the processing modules, each having a separate configuration; and

5 a connecting device for connecting the second opening/closing part of the closed vessel moved by the moving device with the first opening/closing part installed at said one of the processing modules, wherein the 10 connecting device allows the specimens to be loaded/unloaded between the closed vessel and said one of the processing modules by opening the first and the second opening/closing part while connecting the first and the second 15 opening/closing member.

[claim 2]

The plurality of processing apparatuses of claim 1, wherein when the first opening/closing part installed at 20 said one of the processing modules is connected with the second opening/closing part, the connecting device allows said one side of the closed vessel to be closely connected with said one of the processing modules.

[Procedure Amendment 3]

[Document] Specification

25 [Article] 0001

[Type] Amendment

[Contents]

[0001]

[Field of the Invention]

The present invention relates to a plurality of processing apparatuses for performing a plurality of continuous processes on specimens; and, more particularly, to a plurality of processing apparatuses applicable to semiconductor manufacturing apparatuses for performing a plurality of continuous processes on specimens at a vacuum state.

[Procedure Amendment 4]

[Document] Specification

[Article] 0006

[Type] Amendment

15 [Contents]

[0006]

An object of the present invention is to provide a plurality of processing apparatuses capable of easily and precisely loading/unloading specimens to/from a plurality of processing modules and transferring the specimens to a required processing module under the required atmosphere, when necessary.

[Procedure Amendment 5]

[Document] Specification

25 [Article] 0007

[Type] Amendment

[Contents]

[0007]

[Solution]

In order to accomplish the above-described object, the
5 present invention provides a plurality of processing
apparatuses including: a plurality of processing modules,
each having a separate configuration, for performing preset
processes on specimens loaded thereinto; first
opening/closing parts installed at the processing modules to
10 load/unload the specimens, the processing modules being
closed by closing the first opening/closing parts; a
transferable closed vessel accommodating therein the
specimens and having on one side thereof a second
opening/closing part for loading/unloading the specimens; a
15 moving device for moving the closed vessel so that the
second opening/closing part of the closed vessel corresponds
to a first opening/closing part of one of the processing
modules, each having a separate configuration; and a
connecting device for connecting the second opening/closing
20 part of the closed vessel moved by the moving device with
the first opening/closing part installed at the
corresponding processing module, wherein the connecting
device allows the specimens to be loaded/unloaded between
the closed vessel and the corresponding processing module by
25 opening the first and the second opening/closing part while
connecting the first and the second opening/closing member.

Further, in accordance with the embodiment of the present invention, when the first opening/closing part installed at the corresponding processing module is connected with the second opening/closing part, the connecting device allows
5 one side of the closed vessel to be closely connected with the corresponding processing module.

[Procedure Amendment 6]

[Document] Specification

[Article] 0008

10 [Type] Amendment

[Contents]

[0008]

Due to the aforementioned configuration, the specimens can be transferred to any one of the processing modules,
15 each having a separate configuration, by a transferable closed vessel having the second opening/closing part. Thus, the specimens can be transferred to any one of the processing modules by the moving device without being affected by the external atmosphere. When the specimens are loaded into any one of the processing modules or unloaded from any one of the processing modules to the closed vessel,
20 the connecting device connects the second opening/closing part installed at one side of the closed vessel with the first opening/closing part of any one of the processing while positioning the first and the second opening/closing part. Further, when the first opening/closing member is
25

connected with the second opening/closing member by the connecting device, the specimens can be loaded into or unloaded from the closed vessel by opening the first and the second opening/closing part. Accordingly, the specimens can
5 be transferred to a required processing module under the good atmosphere, when necessary. Moreover, since the closed vessel and the processing modules are appropriately arranged by the connecting device, the specimens can be easily and precisely loaded into or unloaded from the processing
10 modules. Furthermore, when the first opening/closing part installed at any one of the processing modules is connected with the second opening/closing part of the closed vessel, the connecting device allows one side of the closed vessel to be closely connected with the corresponding processing
15 module. As a consequence, an inner space of the closed vessel can be connected with that of the processing module without being affected by the external atmosphere and, further, the specimens can be loaded/unloaded under the good atmosphere.

20 [Procedure Amendment 7]

[Document] Specification

[Article] 0015

[Type] Amendment

[Contents]

25 [0015]

[Effects of the Invention]

As described above, in accordance with the present invention, the specimens can be transferred to any one of the processing modules, each having a separate configuration, by a transferable closed vessel having the second opening/closing part. Thus, the specimens can be transferred to any one of the processing modules by the moving device without being affected by the external atmosphere. When the specimens are loaded into any one of the processing modules or unloaded from any one of the processing modules to the closed vessel, the connecting device connects the second opening/closing part installed at one side of the closed vessel with the first opening/closing part of any one of the processing while positioning the first and the second opening/closing part. Further, when the first opening/closing member is connected with the second opening/closing member by the connecting device, the specimens can be loaded into or unloaded from the closed vessel by opening the first and the second opening/closing part.

20 [Procedure Amendment 8]
[Document] Specification
[Article] 0016
[Type] Change
[Contents]
25 [0016]

Accordingly, the specimens can be transferred to a

required processing module under the good atmosphere, when necessary. Moreover, since the closed vessel and the processing modules are appropriately arranged by the connecting device, the specimens can be easily and precisely loaded into or unloaded from the processing modules. Furthermore, when the first opening/closing part installed at any one of the processing modules is connected with the second opening/closing part of the closed vessel, the connecting device allows one side of the closed vessel to be closely connected with the corresponding processing module. As a consequence, an inner space of the closed vessel can be connected with that of the processing module without being affected by the external atmosphere and, further, the specimens can be loaded/unloaded under the good atmosphere.

15

(72) The present inventor

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